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## Creep Behavior of Insulated Concrete Sandwich Panels with Fiber-Reinforced Polymer Shear Connectors

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### ABSTRACT

Insulated concrete sandwich panels have been widely used because of their advantages of light weight and energy efficiency. More recently, research has been conducted to study their applications as roof/floor panels, where long term creep behavior is an important design concern. This paper presents a combined experimental and analytical study on the creep behavior of insulated concrete sandwich panels under bending. Four concrete panels were tested for creep loading. One was a conventional solid reinforced concrete slab, which was used as a benchmark panel. The other three sandwich panels had top and bottom concrete wythes with various thicknesses and a 76 mm (3") insulation layer in the middle. The wythes were connected with FRP segmental shear connectors. There were also steel reinforcing bars in both longitudinal and transverse directions. The tests were conducted with a static load of approximately 13.3 kN (3,000 lbs), which corresponded to the linear-elastic range of the panel's load-deflection curve. The duration of the test ranged from 150 days to 250 days for different panels. It can be concluded that one sandwich panel showed better long-term deflection results than the solid panel. Equations from American Concrete Institute (ACI) Building code and Finite Element (FE) method were used to analyse the panels. Good correlations can be observed between the FE and test results.

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